II. REMARKS

Formal Matters

Claims 1, 2 and 6-25 are pending after entry of the amendments set forth herein.

Claims 1, 2, and 6-21 were examined and were rejected.

Claims 22-25 are added. Support for new claims 22-25 is found in claims 1-5, 13, and 14 as originally filed, and throughout the specification. Accordingly, no new matter is added by these new claims.

Applicants respectfully request reconsideration of the application in view of the remarks made herein.

Rejection under 35 U.S.C. §103(a)

Claims 1, 2, and 16-19 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Yang et al. ((1997) *Vaccine* 15:1303-1313; "Yang") in view of Kumar et al (April, 2002) *Immunology Letters* 81:13-24) and Bujard et al. (WO 98/14583; "Bujard").

The Office Action stated: 1) Yang teaches a recombinant vaccinia virus encoding a *Plasmodium falciparum* merozoite surface antigen (MSA1); 2) Yang does not teach that the recombinant vaccinia virus merozoite surface protein-1 (MSP-1) protein is from the 3D7 or FCB1 strain of *P. falciparum*, or an MSP-1 with reduced AT content; 3) Kumar teaches a DNA plasmid vaccine encoding MSP-1 from the 3D7 strain of *P. falciparum*; and 4) Bujard teaches a *Plasmodium* species that is stabilized by a process characterized by a reduction of the AT content. The Office Action also stated that a Modified Vaccinia Ankara (MVA) was developed as an expression vector, citing Yang. The Office Action concluded that the combination of references teaches the claimed invention. Applicants respectfully traverse the rejection.

The law regarding obviousness

In order to meet its burden in establishing a rejection under 35 U.S.C. § 103(a), the Patent Office must first demonstrate that the combined prior art references teach or suggest all the claimed limitations.[1] In addition to demonstrating that all elements were known in the prior art, the Patent Office must also articulate a reason for combining the elements.[2] A generalized motivation to develop a method is not the kind of motivation required by the patent laws.[3]

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[1] M.P.E.P. § 2143(A).
[2] *See, e.g., KSR Int'l Co. v. Teleflex Inc.,* 127 S. Ct. 1727 (2007) ("KSR") at 1741; *Omegaflex, Inc. v. Parker-Hannifin Corp.,* 243 Fed. Appx. 592, 595-596 (Fed. Cir. 2007) citing *KSR*; and *Innogenetics, N.V. v. Abbott Laboratories,* 512 F.3d 1363, 1373, 85 USPQ2d 1641 (Fed. Cir. 2008).
[3] *Innogenetics, N.V. v. Abbott Laboratories,* 512 F.3d 1363, 1373, 85 USPQ2d 1641 (Fed. Cir. 2008).

The Court in *KSR* repeatedly emphasized that an obviousness inquiry must take into account the predictability of the field:[4]

> the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson's-Black Rock* are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

(emphasis added)

The Supreme Court in *KSR* stated that "a court *must* ask whether the improvement is more than predictable use of prior art elements according to their established functions."[5] The Court in *KSR* cited *Sakraida v. AG Pro*.[6] In *Sakraida v. AG Pro, Inc.*, the Court derived from the precedents the conclusion that when a patent "simply arranges old elements with each performing the same function it had been known to perform" and yields no more than one would expect from such an arrangement, the combination is obvious.[7]

A vaccine composition comprising a recombinant MVA virus in the absence of an adjuvant, would not have been obvious as of the October 23, 2002 priority date.

As discussed in the amendment, filed on June 27, 2008 and responsive to the December 28, 2007 Office Action, the MVA vector is a **highly attenuated** vector. It is well established in the art that MVA is a strongly attenuated vector which **typically involves use of an adjuvant** when using MVA as a vector. In particular, as Yang noted, an immune response to malaria antigen generally requires adjuvant use. Yang, bridging sentence pages 1311-1312.

In contrast to the prevailing view in the art, it was shown that a vaccine preparation comprising a subject recombinant MVA virus was effective in inducing a humoral immune response *in the absence of an adjuvant*. See, e.g., instant specification, paragraphs 0084-0098; and Figure 4. Such a result would not have been predicted from the cited art.

[4] *KSR Int'l Co.*, 127 S. Ct. at 1740 (citations omitted).
[5] *Id.* at 1740; (emphasis added).
[6] *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 96 S. Ct. 1532, 47 L. Ed. 2d 784 (1976).
[7] *Id.* at 282.

One cannot necessarily extrapolate from vaccinia virus to MVA.

The Office stated that it would have been obvious to the person of ordinary skill in the art at the time the invention was made to use an MVA vector "because Yang teaches that it is highly attenuated and has been successful in vaccine models." Office Action, page 6.

However, one cannot necessarily extrapolate from vaccinia virus (the virus used in Yang) to MVA. First, as noted above, MVA is highly attenuated, compared to vaccinia virus. It was not necessarily predictable, based on the results of Yang with vaccinia virus, that recombinant MVA comprising a nucleic acid encoding *Plasmodium falciparum* MSP-1 proteins or fragment would be efficacious.

Thus, a recombinant MVA vector comprising a nucleic acid encoding *Plasmodium falciparum* MSP-1 proteins or fragment does **not** involve "predictable use of prior art elements according to their established functions." A recombinant MVA vector as claimed, or a vaccine composition comprising same, is **not** simply a predictable variation of prior art elements.

Conclusion as to the rejection under 35 U.S.C. §103(a)

Applicants submit that the rejection of claims 1, 2, and 6-21 under 35 U.S.C. §103(a) has been adequately addressed in view of the remarks set forth above. The Examiner is thus respectfully requested to withdraw the rejection.

III. CONCLUSION

Applicants submit that all of the claims are in condition for allowance, which action is requested. If the Examiner finds that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

The Commissioner is hereby authorized to charge any underpayment of fees associated with this communication, including any necessary fees for extensions of time, or credit any overpayment to Deposit Account No. 50-0815, order number GRUE-004.

Respectfully submitted,
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Date: April 23, 2009

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